Response to Office Action / Cintins / 10 March 02

"The amendment filed Nov. 20 01 is objected to under 35USC132 because it introduces new matter into the disclosure.

- Objection (1) now deleted from the text.
- Objection (2) now deleted.
- Objection (3) now deleted.
- Objection (4) does not concern new material. The original description of pump 28 as a suction/vacuum pump is an error. From the description of its function and the flow sheet Fig. 5 it is obvious that the described function can only be carried out by a pump producing a positive (above atmospheric pressure) outlet pressure. The term suction/pressure pump is normally used for pumps of this nature and applies in the case at hand.
- Objection (5) now deleted.
- Objection (6) now deleted ("determining" can be seen to be synonymous with "measuring").
- Objection (7) now deleted.

"Claims 8, 9, 14 and 17 are objected to under 37CFR1.75© as being in improper form because a multiple dependent claim must refer to other claims in the alternative only (claim 17), and may not serve as a basis for any other multiple dependent claim (claims 8,9 and 14). **Accordingly, these claims have not been further treated on the merits.**"

In fact with the exception of Claim 17 these claims should have been further treated on the merits.

Reason:

In the response 2.April.01 to office action 3 March 01

- Dependent claim 8 was cancelled.anyway.
- Dependent claim 9 refers in the alternative to any one of claims 1-6. Multiple dependent claim 5 , independent claim 1 and single dependent claim 2 were effectively cancelled with bracketing leaving independent claim 3 and single dependent claims 4 and 6 as sole effective references.
- Dependent claim 14 refers in the alternative to any one of claims 4-6 , effectively referring to single dependent claims 4 and 6 as sole effective references.
- In the present response claim 17 is cancelled.

Claims 1-7 are rejected under 35USC112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor, at the time the application was filed, had possession of the claimed invention. The limitation that a "pressure pump" is located in the system (claim 1,5 and 7, line 18) does not appear to be supported by the disclosure originally filed, and hence constitutes new matter, since this original disclosure only taught suction/vacuum pump 28 in the system.

In the original IPC disclosure pages 2/3 under the heading THE INVENTION:

""Filter aid suspended in liquid in tank 11 is dosed into the vented container 5. While the **pressure difference between the container 5 and the lower filtrate chamber 2 is raised, liquid to be purified in reservoir 10,.....is pumped using means 22 from reservoir 10 into container 5. Simultaneously, suspensions .....are dosed** using means 7/20 & 8/19 **under pressure** "

In the original IPC disclosure means 22 is obviously a **"pressure pump located in a conduit** (here 12) **in fluid connection with the means of contaminant supply** (here 10) **and the interior of the upper contaminant chamber delivering liquid to be purified to the container** (here 5)".

Page 3, l 8-12:
"Filtrate is recycled, if necessary by means of a suction/vacuum pump (28) through conduits 16 & 117 to reservoir 10.....Filtrate flow is switched to conduit 18 whence it is collected in a reservoir not shown. On reaching a pre-set **pressure differential** across the bed ....."
Although some suction/vacuum pumps can transport liquid issuing from the outlet the designation here of suction/vacuum pump is obviously an error and should read suction/pressure pump. The functioning of this pump is not of vital importance to the process..
The **pressure differential across the bed** is the function carried out by means 22 (a pressure pump).
"

„Claims 1-7, 12, 15 and 16 are rejected as failing to define the invention in the manner required by 35 USC 112, second paragraph.
The claims contain numerous vague and indefinite expressions.
For example

- The term "that functions intermittently and in the stationary, sealed position (Claims 1, 5 and 7, line 2) lacks antecedent basis in the claims, and is therefore indefinite.
  False from original application, p.2, under THE INVENTION: "Fig.1 is a schematic flow-sheet of the apparatus of the invention that consists of a purifying filter plant 1,.....a lower **stationary filtrate chamber**.....on which a section of an **intermittently movable** filter belt..... which in operation is **stationary** and **sealed at the periphery** by vertically movable dependent rim portions 3 of an upper contaminant container 5 "
  All the essential characteristics quoted are supported in the original IPC disclosure.
- The term "whereby means are provided" (claims 2-4, lines 1-2) is vague and indefinite as to the limitation intended.
  Wrong Claim 2 is cancelled and in Claim 3 the term is not present. .
  Claim 4 "once amended" and Claim 6 "once amended" appear to have been meant and the limitations **7/20** and **8/19** are now introduced in these claims as "second amendments".
  The term "the pervious horizontal base (2)" (claim 5, line 44) lacks antecedent basis in the claim and is therefore indefinite.
  False claim 5 is cancelled.
  Apparently claim 12 "once amended" is meant.
  (see original IPC disclosure above –first bullet THE INVENTION "Fig 1 is a .....lower stationary filtrate chamber 2 with a porous upper surface on which a section of an intermittently movable filter belt.....sealed at the periphery".).
  To avoid further discussion the phrase "to coincide .....horizontal base" is now cancelled.
- Claims 12, 15 and 16 depend from a cancelled claim (i.e. claim 10) and are therefore indefinite.
  False in "once amended" Claims 12 and 15 the dependency on Claim 10 was deleted and for claim 16 a dependency on Claim 10 never existed.

Furthermore the terms

- "are used as" (claim 12, lines 1-2)
  semantics only (serve as, act as, are designed to, meant to, etc, can all be used)
  appropriate" (claim 12, line 3)
  semantics only (right, correct, exact, precise, required etc. are all appropriate).
- "apparatus and method"(claims 15 and 16, line 1)
  15 is a separate apparatus claim and 16 is a separate method claim.

- "according to the defining preamble" claim 15, line 1)...
  False (already deleted in the "once amended" claim 15).
- "are employed" (claim 15, line 5)
  False (already deleted in "once amended" claim 15)
- "known quality" (claim 15, line 7)
  False (already deleted in "once amended" claim 15)
- "such as" (claim 16, line 3)
  False (already deleted in "once amended" claim 16)
- choose and implement the supply of the optimal filter medium" (claim 16, lines 4-5) are vague, and indefinite as to the limitations intended.
  False (already deleted in "once amended" claim 16).
- Claim 6 depends from an indefinite claim (i.e. 2 or 3) and is therefore itself indefinite.
  Wrong (meant is claim 14 "once amended" dependent on Claim 4 and 6 each now "twice amended" and no longer indefinite.

Enclosed are

1) Copy of the complete amended claims at Maay, 02
2) Copy of the "clean" version at May, 02 of claims after "second amendments" for the purpose of clarity only.
3) Copy of the complete amended description at May, 02
4) Copy of the "clean" version at May, 02

AMENDMENTS

APPARATUS FOR LIQUID PURIFICATION

Description

This invention concerns apparatus for the purification of liquids. By purification is meant the removal of unwanted suspended, colloidal or dissolved substances from a liquid.

The prior art apparatus to achieve this consists of a large variety of generically related filters that utilize over-pressure and/or under-pressure to provide the necessary pressure difference for filtration.

For the purification of liquids, filter presses or pressure leaf, candle and cartridge filters (pressure vessels containing such elements) are [mainly] utilized. Such liquids are chemicals, pharmaceutical products, beer, wine, sugar, oils and fats, petroleum products, etc. Their purification [normally] involves [some form of] an "in-depth" filtration or purification process, whereby the liquid to be purified is either passed through or forms thereby a bed of particulate purification aid, whereby the separation mechanism is [mostly] a combination of sieving-action and adsorption. The purification aids that are used include diatomaceous earth, bleaching earth, ion-exchange resin and activated carbon [,etc., all normally] in powder form. The solid residues can [rarely] not be economically regenerated and their disposal poses an acute environmental problem.

On the other hand, using apparatus of the nutsche-type filter [in the form of] with open or closed containers, water is filtered by means of gravity or over-pressure on a large scale by means of thick, static beds of coarse granular material (e.g. sand). These beds are regenerated after filtration by back-washing techniques and reused. Although this method is suitable for the filtration of relatively clean surface and ground water, it is wholly unsatisfactory for the purification of industrial and domestic effluent. The reason is that the back-washing and regeneration techniques of prior art sand filters

- are inadequate for washing out [most of] the large variety of suspended solids contained in industrial liquid effluent.

[and]

- produce excessive amounts of contaminated back-wash liquid.

and

- [Added to this,] the static nature of the beds is unsuited for the filtration of particulate matter as large sections of the bed remain unused [and the necessity for utilizing relatively coarse granular material comprising the beds for removing organic and inorganic contaminants in solution] thus [precludes] precluding [on economic grounds] the possibility of utilizing the extensive range of available adsorbents comprising such materials as activated carbon, anthracite, ion-exchange resins, bleaching earth, molecular sieves, etc. required for removing [relatively small concentrations of] specific [organic and inorganic] contaminants [in solution and in a colloidal state] in the field of effluent and water purification.

- [Prior art sand filtration inherently lacks the flexibility and versatility to handle today's demanding liquid purification requirements in the liquid processing industries.]

The goal of this invention is to further develop the art and science of "in-depth" filtration utilizing beds of loose material for the purification of liquids such as processed by the above named industries, whereby the beds for reuse are regenerated [and reused] more effectively than with prior art methods, resulting in a considerable reduction in the quantity of liquid and solid waste generation. [for disposal.]
Considering the present practice in both the industrial and communal sectors of discharging effluent to the natural environment that is incompletely purified, the further goal is to provide these sectors with an effluent and water purification apparatus that will enable liquid effluent to be recycled and polluted water to be rendered suitable for domestic and industrial purposes.
It is further proposed that the apparatus of the invention will be far more compact and versatile compared with the prior art in that it can be installed not only in large industrial and communal plants, but also in medium to small size industrial sectors. This will be achieved by ulitizing specific throughputs 10-100 times those normally employed by prior art filters. Specific throughputs of 50-200 $m^3/m^2.h$ will be possible because the beds will be maintained in the "open" condition throughout the filtration and/or purification cycles. Yet a [A] further goal of the invention is to provide the liquid purification apparatus of the invention with the means for automatically selecting and applying varying types and grades of filter media and modes of operation according to the nature, filtration characteristics and requirements of any type of liquid purification operation, whereby no further distinction will be made between effluent, water and process liquid purification. The ultimate aim of the invention is to reduce the number of purification steps presently required for process liquid purification, whereby waste generation will be reduced and the purification media regenerated and reused, thus enhancing the competitiveness of these industries and simultaneously relieving the present negative impact on the environment. [The aim of the invention with] As for industries presently using liquids in their production processes for such operations as plating, dyeing, washing, coating, pickling, quenching, etc. the aim is to provide the means for [continuous total media] regeneration to avoid altogether the necessity for waste dumping into the environment.

THE INVENTION

Fig. 1 is a schematic flow-sheet of the apparatus of the invention.
Fig. 2 is a schematic representation of a partly sectioned elevation of the media feeding mechanisms of the invention.
Fig. 3 is a sectioned drawing illustrating an improved apparatus for controlling the vertical movement of the container.
Fig. 4 shows apparatus for the control of the liquid purification process and filter operation.
Fig. 5 illustrates an innovative filtrate chamber design.
Fig. 6 shows schematically the concept of the reversible belt transport of the invention.

[Fig. 1 is a] The schematic flow-sheet of the apparatus of the invention Fig.1 [that consists of a] shows the purifying filter plant 1, comprising essentially a lower stationary filtrate chamber 2 with a porous upper surface on which a section of an

intermittently movable filter belt 4 is supported which in operation is stationary and sealed at the periphery by vertically movable dependent rim portions 3 of an upper contaminant container 5 fitted with a conically perforated feed distributor 27 extending over the entire upper horizontal section, a bed regeneration apparatus 6, a bed material storage/dosing [vessel] device 7/20, a filter aid suspension tank 11, one or more adsorbent storage/dosing devices 8/19, a reservoir for liquid to be purified 10 and a residue filter 9.

Filter aid suspended in liquid in tank 11 is dosed into the vented container 5. While the pressure difference between the container 5 and the lower filtrate chamber 2 is raised, liquid to be purified in reservoir 10, which may be dosed with flocculating substances such as polyelectrolytes, is pumped using means 22 from reservoir 10 into container 5. Simultaneously, suspensions of bed material recycled from regenerator 6 and activated powdered adsorbents are dosed using means 7/20 and 8/19 under pressure to a mixing section [27] 29 of the delivery conduit 12 controlled by microprocessor 15 from input data from instrumentation 13 and 14 in the delivery conduit 12 and the filtrate conduit 16 respectively. The liquid quality and process parameters (concentration) controlled include turbidity, pH, hardness, chlorinated [organics] organic substances, mineral oil, heavy metals, phosphates, nitrates, etc. as well as process variables such as pressure differential and throughput. Filtrate is recycled, if necessary, by means of a suction/[vacuum] pressure pump 28, through conduits 16, 17 to reservoir 10 until the concentration of contaminants in the filtrate is reduced to a set level as measured at 13. Filtrate flow is then switched to conduit 18 whence it is collected in a reservoir not shown. On reaching a pre-set pressure differential across the bed or a pre-set upper level of contaminant concentration as measured by instrumentation 13, pump 22 and all dosing apparatus are shut down and external gas is fed through conduit 23 to container 5 whereby the residual liquid in the chamber and bed is removed, after which the dependent rim portions 3 of the container 5 are raised and the bed is transported by the filter belt 4 and discharged into the bed regenerator 6. The dependent rim portions 3 are lowered onto a fresh section of belt and the cycle described above is repeated. The regenerator 6, in effect, removes adsorbate and entrapped particulate matter [(] by means of ultra-sonic [devices], turbulence and diffusion producing devices [diffusion enhancing processes,] [etc.] from the internal and external surfaces of the granular material, [which may be an adsorbent itself,] thereby regenerating, cleaning and restoring the desired activities to these surfaces. Clean liquid is introduced to 6 through conduit 24 and by means of hydraulic classification action the adsorbate and particulate matter are removed through conduit 25 to filter 9 to recover a solid waste. Depending on its nature, the recovered fluid is recycled to 10 or reprocessed. Not shown are the means for introducing and removing the bed regenerating and reactivating fluids to and from bed regenerator 6.

Fig. 2 is a schematic representation of a partly sectioned elevation of the media feeding mechanisms of the invention. Prior art filters have the disadvantage that a replacement of the filter medium involves lengthy shut-down periods and often excessive manual manipulation. A further goal, therefore, of the present invention is to provide the means for automatically and quickly fitting a large variety of prefabricated materials (e.g. membranes, paper, carton, etc.) to fulfil the requirements of the liquid processing industries. Pressure cylinders 215, normally [taking the form of] hydraulic or pneumatic rams, are provided for actuating the dependent rim

Start

Testing:

1. A section of 10 micron retention filter paper from 212 is automatically fed into the container.
2. The dependent rim portions of the container 5 are lowered to seal the section of paper lying on the filtrate chamber.
3. The differential pressure controller 404 establishes a pre-set pressure differential between the chamber sealing space 402 and the filtrate chamber 403.
4. With the container 1 vented, approx. 15 l/m^2 of the suspension are introduced to the top container 5 and distributed over the surface of the sealed section of filter paper.
5. Compressed gas is introduced to the top chamber through control valve 407, whereby the gas pressure and flow controllers 405/6 control the filtration operation and [provide the data input to the microprocessor for computing] indirectly establish the filtration characteristics of the suspension by [measuring] determining the [instantaneous] volumetric flow of gas in the top container 5. Simultaneously,[A sample of] filtrate flows through a turbidity meter 410 to record the degree of clarity of the filtrate for input to the microprocessor.

L .....

The computer chooses the filtration mode and type of medium.
Mode: pre-coat with medium speed diatomite with 1% body feed.
Medium: 20 micron polyester[-monofil] mono-filament section of belt.

.....

6. The [depending] dependent rim portions 3 are raised and the filter paper is discharged.
7. The 20 micron belt section is automatically positioned in the container 1.
8. Steps 3,4,5 are repeated with a liquid of known filtration characteristics.
9. (a) Result of permeability test: negative. The section of belt is subjected to a standard cleaning/regeneration procedure after which steps 3,4,5 are repeated. (b) Result: positive. With the container 1 vented, approx. 20 l/m^2 of diatomite suspension are introduced to the top container 5.

Filtration Operation:

10. While the chamber 5 is being pressurised with gas, suspension to be filtered with 1% diatomite body-feed is introduced under pressure through valve 401. The feed rate is controlled by a pressure differential controller 405. Filtration proceeds.
11. On reaching a pre-set pressure differential, filtration terminates. Valve 401 shuts.
12. Valve 407 opens. Gas forces rest suspension through the filter cake.
13. Gas flow controller 406 signals a break-through of gas through the filter cake.

Cake Washing:

14. Valve 407 shuts.
15. Valve 408 opens. A pre-set quantity of wash liquid is fed to the container 5.
16. Valve 408 shuts. Valve 407 opens. Gas forces wash liquid through the cake.
17. The flow controller 406 signals a break-through of gas through the filter cake.

Cake Drying:

18. [Cake drying.] Gas continues to flow through the filter cake.
19. [Timer shuts valve]Valve 407 shuts. Container is vented by opening 411. Container opens.

Cake Discharge:

20. Belt transport. [Cake discharge.]
21. Belt wash (belt wash liquid is used for subsequent cake wash operation).
22. 20 micron belt section relocated in the container 1.

-cycle repeated-

Fig. 5, 6 show a schematic representation of an innovative filtrate chamber 2, whereby the prior art fixed pervious bed [of the prior art] is replaced by manually removable pervious elements 502 to facilitate the cleaning and/or sterilization of the internal surfaces and drainage members 504. According to the invention only planar, smooth surfaces of the floor of the filter chamber remain after the manual removal of the elements. In a preferred design, the filtrate chamber consists of hollowed-out plate 505 with smooth polished upper surfaces on which the removable elements, [preferably] consisting of expanded sheets or layers of woven mesh of metal or plastics [that] which are covered and are integral with flat perforated sheet, mesh or profiled grid material. To accommodate the high liquid through-puts of the invention and to minimize the bulk and cost of the elements, generously proportioned multiple filtrate outlet conduits 506 are provided, [preferably] coinciding with the [intevals] intervals of the fluid driven cylinders 215, whereby the conduits are made integral with the supporting framework and designed to support the filtrate chamber as well as to withstand the thrust of the closure of the upper container. These conduits are also designed for ease of access and cleaning.

Fig. 7 shows a schematic drawing, wherein the filter web [takes the form] consists of a belt that is driven by a motor or actuator 702 to reverse the direction of transport of the belt to enable the discharge of the filter bed or filter cake at either end of the purifying apparatus 1. One of the major advantages of this configuration is that the permanent attachment of a bed regenerator 6 and a filter cake receiver at either end can be [achieved.] accommodated.

The above described invention effectively bridges the gap between prior art sand (in-depth) and pressure filters presently employed in the liquid processing industries. The implications are that both liquid processing and using industries can be rationalized and improved to increase their competitiveness and simultaneously reduce [considerable] considerably the present negative impact on the environment.

Amended claims

CLAIMS

1 . CANCELLED

2 . CANCELLED

3. "once amended"

[Liquid filtering apparatus according to Claim 1, thereby characterized, that means are provided to discharge the bed to a bed regeneration device (6), where the material of the bed is cleaned or cleaned and reactivated and thence recycled to a dosing device (7/20) and thence to the turbid liquid chamber (5) of the filtering apparatus (1) for reuse.] In a travelling web, flat bed filter apparatus that functions intermittently and in the stationary, sealed position receives contaminated liquid in a horizontal upper chamber and delivers filtered liquid from a lower filtrate chamber having a section of filter web or medium lying on and supported by a horizontal, fixed, pervious support plate or fixed drainage plate; cover means with dependent rim sections extending downwards, the lower surfaces of which make direct sealing engagement with peripheral portions of said section of filter medium or web, thus forming an upper contaminant chamber; a receptacle for filtered liquid located beneath the support plate having upstanding rim portions or a drainage plate with extended rim portions, whereby the upper surfaces of said rim portions make sealing engagement with the lower peripheral portions of the section of the filter medium or web, thus forming a lower filtrate chamber or drainage space; means for engaging and disengaging the said sealing surfaces of the upper cover and lower receptacle or recess, thus sealing and releasing respectively the said portions of the filter web; either a pressure pump located in a conduit in fluid connection with the means of contaminant supply and the interior of the upper contaminant chamber, combined with a liquid pressure pump the inlet of which is in liquid communication with the interior of the said receptacle for filtered liquid; or a suction/vacuum pump located directly in a conduit in fluid connection with the interior of the lower filtrate chamber or drainage space or indirectly through a filtrate receiver with a conduit in fluid communication with the interior of the lower filtrate chamber or drainage space; each of said pump configurations providing the means for transporting both contaminated and filtered liquid thereby creating and maintaining a pressure difference between the contaminant and filtrate chambers or drainage space; conduit means

in fluid communication with a source of compressed gas and/or the surrounding atmosphere and the interior of the upper contaminant chamber; means for controlling the filtration operation consisting of liquid level and pressure switches connected to the filter chambers set to switch at maximum and/or minimum values, whereby said liquid level switches control the means for interrupting and initiating fluid flow in the gas conduits and the pressure switches are employed for interrupting or initiating the flow in the said liquid and gas conduits; transport means in engagement with the filter web to transport it over the said support plate consisting of a belt conveyor connected on both sides with chain and drive sprockets, whereby the improvement comprises means for the surface of the belt itself to act as both the filter web and conveyor of a granular filter bed that after use as filter medium is conveyed to means (6, 21) for the cleaning, regeneration and return of the grains of the bed directly to the said upper contaminant chamber or to an intermediate storage vessel for a subsequent filtration or purification cycle

4. "twice amended"
[Liquid filtering apparatus according to Claim 1, thereby characterized, that means are provided to discharge the bed to a bed regeneration device (6), where the material of the bed is cleaned or cleaned and reactivated and thence recycled to the dosing device (7/20) and thence dosed to the turbid liquid chamber (5) of the filtering apparatus (1) during the filtration operation, whereby the depth of the bed increases incrementally during the operation.]
A liquid purification system according to **Claim 3 "once amended"**, whereby means (7/20) are provided for dosing the cleaned and regenerated grains to the said contaminant chamber or to the feed of liquid to be purified during the purification operation.

5. CANCELLED

6. "twice amended"
[Liquid purifying apparatus and method according to Claim 5, thereby characterized, that a dosing apparatus (8/19) is employed to dose the active powdered material to the granular material of the bed either before or during the purification operation when the depth of the bed increases incrementally.]
A liquid purification apparatus according to **Claim 3 "once amended"**, whereby means (7/20, 8/19) are provided to dose pre-mixed or separately dose cleaned and regenerated grains of the bed with the powdered adsorbent materials to the said contaminant filter chamber or the feed of liquid to be purified during the purification process.
7. CANCELLED
8. CANCELLED
9. "twice amended"
Liquid filtering apparatus according to [Claim 1, thereby characterized, that] [any one of Claims 1-6], **Claim 4 "twice amended" or Claim 6 "twice amended"** whereby means are provided in the form of a conically perforated distributor (27) that

extends over the entire internal cross-section of the turbid liquid chamber (5).

10. CANCELLED

11. CANCELLED

12. "twice amended"

In a travelling web, flat bed filter apparatus that functions intermittently and in the stationary, sealed position receives contaminated liquid in a horizontal upper chamber and delivers filtered liquid from a lower filtrate chamber having a section of filter web or medium lying on and supported by a horizontal, fixed, pervious support plate or fixed drainage plate; cover means with dependent rim sections extending downwards, the lower surfaces of which make direct sealing engagement with peripheral portions of said section of filter medium or web, thus forming an upper contaminant chamber; a receptacle for filtered liquid located beneath the support plate having upstanding rim portions or a drainage plate with extended rim portions, whereby the upper surfaces of said rim portions make sealing engagement with the lower peripheral portions of the section of the filter medium or web, thus forming a lower filtrate chamber or drainage space; means for engaging and disengaging the said sealing surfaces of the upper cover and lower receptacle or recess, thus sealing and releasing respectively the said portions of the filter web; either a pressure pump located in a conduit in fluid connection with the means of contaminant supply and the interior of the upper contaminant chamber, combined with a liquid pressure pump the inlet of which is in liquid communication with the interior of the said receptacle for filtered liquid; or a suction/vacuum pump located directly in a conduit in fluid connection with the interior of the lower filtrate chamber or drainage space or indirectly through a filtrate receiver with a conduit in fluid communication with the interior of the lower filtrate chamber or drainage space; each of said pump configurations providing the means for transporting both contaminated and filtered liquid thereby creating and maintaining a pressure difference between the contaminant and filtrate chambers or drainage space; conduit means in fluid communication with a source of compressed gas and/or the surrounding atmosphere and the interior of the upper contaminant chamber; means for controlling the filtration operation consisting of liquid level and pressure switches connected to the filter chambers set to switch at maximum and/or minimum values, whereby said liquid level switches control the means for interrupting and initiating fluid flow in the gas conduits and the pressure switches are employed for interrupting or initiating the flow in the said liquid and gas conduits; transport means in engagement with the filter web to transport it over the said support plate consisting of a belt conveyor connected on both sides with chain and drive sprockets, [Liquid filtering apparatus according to Claim 10,] whereby sections of the band are used as support for discrete strips of prefabricated filter media from storage means pre-cut ["in-situ"] to appropriate length and then introduced to the interior of the turbid liquid chamber (5) [to coincide with the pervious horizontal

base (2)] and sealed at the periphery [(402)] by the dependent rim portion(s) (3) of the said chamber.

13. CANCELLED

14. "twice amended"

Liquid purifying apparatus according [to any one of Claims 4-6], **to Claim 4 "twice amended" or Claim 6 "twice amended"**[thereby characterized, that] whereby the dosing devices are controlled by a microprocessor (15) from input signals from feed and filtrate instrumentation (13,14).

15. "once amended"

In a travelling web, flat bed filter apparatus that functions intermittently and in the stationary, sealed position receives contaminated liquid in a horizontal upper chamber and delivers filtered liquid from a lower filtrate chamber having a section of filter web or medium lying on and supported by a horizontal, fixed, pervious support plate or fixed drainage plate; cover means with dependent rim sections extending downwards, the lower surfaces of which make direct sealing engagement with peripheral portions of said section of filter medium or web, thus forming an upper contaminant chamber; a receptacle for filtered liquid located beneath the support plate having upstanding rim portions or a drainage plate with extended rim portions, whereby the upper surfaces of said rim portions make sealing engagement with the lower peripheral portions of the section of the filter medium or web, thus forming a lower filtrate chamber or drainage space; means for engaging and disengaging the said sealing surfaces of the upper cover and lower receptacle or recess, thus sealing and releasing respectively the said portions of the filter web; either a pressure pump located in a conduit in fluid connection with the means of contaminant supply and the interior of the upper contaminant chamber, combined with a liquid pressure pump the inlet of which is in liquid communication with the interior of the said receptacle for filtered liquid; or a suction/vacuum pump located directly in a conduit in fluid connection with the interior of the lower filtrate chamber or drainage space or indirectly through a filtrate receiver with a conduit in fluid communication with the interior of the lower filtrate chamber or drainage space; each of said pump configurations providing the means for transporting both contaminated and filtered liquid thereby creating and maintaining a pressure difference between the contaminant and filtrate chambers or drainage space; conduit means in fluid communication with a source of compressed gas and/or the surrounding atmosphere and the interior of the upper contaminant chamber; means for controlling the filtration operation consisting of liquid level and pressure switches connected to the filter chambers set to switch at maximum and/or minimum values, whereby said liquid level switches control the means for interrupting and initiating fluid flow in the gas conduits and the pressure switches are employed for interrupting or initiating the flow in the said liquid and gas conduits; transport means in

engagement with the filter web to transport it over the said support plate consisting of a belt conveyor connected on both sides with chain and drive sprockets, [Apparatus and method of filtration control according to the defining preamble of claim 10, whereby means to control the filtration operation consist of a gas flow controller, a gas throttling valve and a gas pressure controller connected in series from a source of compressed gas to the turbid liquid chamber (5), thereby characterized, that the said means are employed to measure the permeability of any filter media before or during any liquid filtration or purification operation by introducing and filtering a volume of liquid of known quality to the turbid liquid chamber] whereby the improvement comprises means for determining and/or controlling the rate of filtration of a quantity of liquid contained in the contaminant chamber comprising a gas flow meter (406), gas throttling valve (407) and gas pressure meter (405) in the said conduit in fluid communication with a source of compressed gas and the interior of the upper contaminant chamber.

16. "once amended"

Method of liquid purification control according to Claim 12 or 15, [thereby characterized, that whereby the quality of the turbid liquid and filtrate is determined by instrumentation such as (13, 14), whereby optionally the data are fed to a microprocessor / process controller (15) to choose and implement the supply of the optional filter medium before or during any liquid purification operation.] whereby in conjunction with the determination of the quality of the turbid liquid and filtrate by the means (13, 14), single sheets of known filtration characteristics are employed for determining the filtration characteristics of turbid liquids of unknown filtration characteristics, whereby the sheets after these determinations are transported out of the filter chamber for deposition or whereby sections of the filter band of unknown filtration characteristics are transported onto the said pervious support plate or fixed drainage plate for determining the filtration characteristics with liquids of known filtration characteristics.

17. CANCELLED

18. CANCELLED

19. CANCELLED

20. CANCELLED

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